

I CLAIM:

1. A reel-to-reel tape, having first and second surfaces, for use in the assembly of semiconductor chips,
5 comprising:
a plurality of contact lands and a plurality of electrically conductive routing lines integral with said first surface of said tape; and
a chip mount pad, secured to said first surface,
10 coplanar with said second surface.
2. A reel-to-reel tape, having first and second surfaces and first and second openings, for use in the assembly of semiconductor chips, comprising:
a plurality of electrically conductive routing lines
15 and a plurality of contact lands on said first surface, covering said first openings in said tape; and
a chip mount pad in each of said second openings,
attached to said first surface and shaped to be
20 coplanar with said second surface.
3. The tape according to Claim 2 wherein said routing lines and contact lands are made of copper foil plated with nickel and gold.
4. The tape according to Claim 2 wherein said routing
25 lines and contact lands are created by a photolithographic patterning and chemical etch process.
5. The tape according to Claim 2 wherein said bending of said chip mount pad is provided by a mechanical coining process.
- 30 6. The tape according to Claim 2 wherein said first and second openings are created by a mechanical punching process.

7. A low-profile, high power semiconductor device including a plastic tape having first and second surfaces, a portion of said first surface covered with an adhesive layer, comprising:

5 first and second openings through said tape and adhesive layer, said first openings configured for solder balls and said second openings configured to accommodate circuit chips;

10 a copper foil laminated on said adhesive layer; portions of said copper foil in said second openings mechanically shaped into a position coplanar with said second surface, for use as chip mount pads;

15 circuit chips mounted by means of a thermally conductive material on each of said chip mount pads; and

20 encapsulating material surrounding said mounted chips.

25 8. A low profile, high power semiconductor device including a plastic tape having first and second surfaces, comprising:

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 a plurality of electrically conductive routing lines and a plurality of contact lands on said first surface, said lands exposed by first openings in said tape;

30 second openings in said tape configured to accommodate said chips;

 a chip mount pad in each of said second openings, attached to said first surface and shaped to be coplanar with said second surface;

 a circuit chip mounted by means of a thermally conductive material on each of said chip mount

pads;
bonding wires connecting said chip to said contact
lands;
encapsulating material surrounding said first tape
5 surface including each of said mounted chips and
said wire bonds; and
solder balls attached to each of said exposed lands.

9. The semiconductor device according to Claim 8 wherein
said chip mount pads, coplanar with said second tape
10 surface, provide a direct thermal path to said circuit
chips.

10. The semiconductor device according to Claim 8 wherein
said chip mount pads serve as heat convection surface
for said circuit chips.

15 11. The semiconductor device according to Claim 8 wherein
said package is created by a transfer molding process
of molding compounds, thereby providing mechanical
rigidity to said device even when the device thickness
is kept to a low profile.

20 12. A method of fabricating a reel-to-reel assembly tape
having first and second surfaces, said first surface
having an adhesive layer thereon, for use in the
assembly of semiconductor devices, comprising the steps
of:

25 punching first and second openings through said tape
 and adhesive layer, said first openings
 configured for solder balls, and said second
 openings configured to accommodate said chips;
 laminating a copper foil on said adhesive layer;
 and
 mechanically shaping portions of said copper foil
 into said second openings, thereby positioning

said portions in the same plane as said second surface.

13. A method of fabricating a reel-to-reel assembly tape for use in the assembly of semiconductor devices, comprising the steps of:

providing a reel-to-reel plastic tape having first and second surfaces, at least a portion of said first surface covered with an adhesive layer; punching first and second openings through said tape and adhesive layer, said first openings configured for solder balls, and said second openings configured to accommodate said chips; laminating a copper foil on said adhesive layer; photolithographically patterning and chemically etching said copper foil, thereby creating a plurality of routing lines and contact pads; mechanically shaping portions of said copper foil into a position coplanar with said second surface; and protecting a portion of said etched foil with a solder mask while plating the exposed portions with nickel and gold.

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14. The method according to Claim 13 further comprising the step of singulating individual units from the starting tape.

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15. A method of fabricating a low profile, high power semiconductor device, comprising the steps of:

providing a reel-to-reel plastic tape having first and second surfaces and at least a portion of said first surface covered with an adhesive layer;

punching first and second openings through said tape

and adhesive layer, said first openings configured for solder balls intended to be attached to contact lands, and said second openings configured to accommodate said chips; 5 laminating a copper foil on the adhesive layer; photolithographically patterning and chemically etching said copper foil thereby creating a plurality of routing lines and contact pads; mechanically shaping portions of said copper foil 10 into said second openings, thereby bending said foil to become coplanar with said second surface; and protecting a portion of said etched foil with a solder mask while plating the exposed portions 15 with nickel and gold; mounting a circuit chip on each of said chip mount pads; ~~A~~ wire bonding said chips to said routing lines; encapsulating said first surface of said tape 20 including said each of said mounted chips and bonding wires; and attaching solder balls to the surface of said contact pads exposed by said first tape openings.

16. The method according to Claim 15 further comprising the 25 step of singulating individual packaged devices from the reel-to-reel tape.

17. The method according to Claim 15 wherein said step of encapsulating comprises a transfer molding process of molding compounds providing mechanical rigidity to said device even when the device thickness is kept to a low 30 profile.

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